

**The Lack of Local College Affordability in a Modern America and its Impact on A
Growing Capitalist Economic System**

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ABSTRACT

As the average American youth enters into high school, they are continually hounded with the idea of the importance of college. Attaining a college career is an important factor to determine an individual's workplace value and help them develop into productive societal members. However, the price of college has increasingly become inhibitive to this process. As the price of college continues to eat up sizable chunks of the average family's household, the average American youth is forced to take out increasingly large amounts of student loans. Thus, the overall health of both the individual and the economy is impacted. This study aims to identify the relationship between college tuition costs of community colleges and public colleges and universities in relation to the average income of the surrounding county. With this information, statistics regarding the average percentage of household income spent on college tuition can be garnered. All of this is done in an attempt to better understand the reality of modern American student life.

INTRODUCTION

The notion of the stereotypical American success is one that is plastered throughout our popular culture. Expressions of culture such as television and music embed this concept of success within the American psyche. The idea of one being considered to have “made it” in America is nearly entirely based on their ability to buy symbols of status. Nice houses with picket fences and shiny cars and the acquisition of them have become so ingrained within us as a culture that they are seen not as things to strive for, but rather as rites of passage. A young person buying a house is seen as them growing up. In making this purchase, the individual shows that they are ready to become a fully-fledged part of the American economy. Because, quite simply, with houses come reasons to spend money. One must buy things to put in the house and services to keep the house running. Eventually, they want to fill the house with children and those children open them up to spending even more money. It is a critical juncture in one’s life that drives the American consumerist economy forward. Young people work and buy things and help support the elderly and the children. It is a simple facet of American economic health.

However, increasingly, this notion of the American youth growing up to become an American consumer is threatened. The crippling weight that student loan debt places on the average American twenty-something stunts their growth financially. Thus, the new, young American consumer does not aim to buy a house or a car. Rather, they just wish to get out of debt. This type of financial burden that hangs over their heads makes them into fearful, but not necessarily savvy, purchasers. Instead of buying and buying to drive the economy forward, they fear getting into another contract that could put them in debt. So, they rent their homes instead of

buying them and tend to be in the ‘young and broke’ phase of their lives for much longer. The economy as a whole begins to suffer. The easy answer to this problem is to not get into debt in the first place. However, in a competitive job market, not having a college degree is simply not viable. Going to college is not a choice, but rather an economic necessity. With this comes the need for the unbearable amount of student loan debt. This begs the simple question of “who can afford this?”.

As a result, this study aims to shed light on the stark difference between income and tuition and further explain how college tuition in America is not a commodity that is subject to economic pushes as much as other goods are, which is harming the average college student sometimes irrevocably. Specifically, this study compares the average income of randomly selected counties within the United States. This study examines the relationship between average college tuition of community colleges and public schools universities and the average income of the surrounding county. The results of this comparison will be examined within the context of the strain it puts on family resources, scholarship and other tuition assistance availability and competition, and the economic health of individuals after college graduation.

REVIEW OF LITERATURE

In a recent survey conducted by the American Student Association, they remarked that over 30% of college students directly chose their major on the basis of student loan debt. The ability to pay off debt stands like a monolith for the average American college student. On an individual level, it impacts the average young American in that they consistently feel unwavering amounts of stress, not only because of the coursework, but because of what the coursework is costing them. This can eventually lead to anxiety disorders and other mental health problems. Moreover, this type of paralyzing fear about college debt impacts the American economy as these individuals reach adulthood. The same study conducted by the ASA found that student loan debt and concerns about paying it off led to 75% of participants feeling like they could not purchase a home because of their student loan debt (American Student Association 2-3). Buying a home is a significant step as an individual enters into the economy, and with less and less of individuals choosing not to do so because of their debt, the national economy is directly impacted. However, college is often seen as a necessity to be considered successful in modern American life. Thus, students continue to saddle themselves with debt in a paradoxical struggle between trying to better one's position in an economy and putting oneself in debt so much that they cannot contribute to that economy.

Despite these dangers both to the individual and the economy as a whole, college prices continue to steadily increase. As a CNBC article states, the price of tuition alone at colleges and universities is increasing rapidly, so much so that Yale now charges seventeen times more for tuition than it did in 1971. A commonly held notion is that tuition must keep pace with inflation and therefore must go up: because money is worth less, the universities must collect more of it.

This however, is false. As the same CNBC article reports, inflation is not at all increasing at the same rate that college tuition is. In places, it is increasing at six times the rate of inflation (Schoen). Moreover, the cost of college is much more than tuition. The Department of Education defines several other college costs that can impact a student's total debt from college. These categories include room and board, books and school supplies, fees, and travel expenses, among others. All of these costs have increased proportionally to the tuition hikes as well. One of the main reasons that college costs have increased so dramatically is that colleges must attract high-achieving and high-income students to their schools. Thus, they continually attempt to build bigger and better amenities for their students, and, more importantly, for prospective students. Additionally, schools are increasingly paying their professors more to keep them teaching at their schools.

In the face of these increasing costs, income levels are not rising to meet them. The average income in the United States today is around \$51,939 according to the U.S. Census Bureau. In comparison, the current cost of attendance at Yale is \$65,725. This disconnect between college cost and income level forces students to become increasingly creative with how to pay for college. A host of scholarship websites including Fastwebs, Unigo, and College Depot advertise scholarships like sweepstakes. If one isn't lucky enough to be awarded a scholarship, student loan debt takes over. It is this massive disconnect between income and tuition rates, only moderated by skimpy scholarships, that leads to the outrageously high amount of student loan debt that American accumulate. Thus, this disconnect provides an interesting opportunity for statistical analysis.

PROBLEM STATEMENT

Problem: To examine the relationship between average county income level and the average tuition of colleges and universities within those counties to determine the affordability of attending one's local college, whether that be a public college or university, or a community college.

Hypothesis: The difference between the average income of families within the county and the cost of colleges within that county makes attending college financially unviable for families without some sort of assistance.

Data Measured: Within this study, two different types of data were collected. First, a simple random sample of thirty colleges was conducted of all community colleges within the United States, excluding the American territories. From these thirty schools, the tuition and cost of attendance was recorded, as given by Cappex.com. Then, using Census Bureau data, the average household income for the county in which the college is in was recorded. This method was used to collect information on both community colleges and public colleges/universities. Private colleges and universities were excluded from this aspect of the study because the prices of the school are typically inflated and inaccurately represented because of the increasing prevalence of "full-need" scholarship policies. Moreover, private institutions tend to attract out-of-state students, and thus comparing their prices with average county incomes is ineffective.

DATA COLLECTION METHOD

1. Create an SRS of thirty community colleges and thirty public schools.
 - a. Using online resources such as the College Board website, create a list of all American community colleges and a separate list of all American public colleges and universities.
 - i. Note: colleges and universities that are located in U.S. territories, although often included on college lists, should not be included in this study due to inconsistencies with how territories and the United States use the county system.
 - b. Alphabetize both of these lists.
 - c. Using a random number generator, select thirty random numbers. Using these numbers and their corresponding colleges, select thirty colleges from each list.
2. After compiling a list of the two types of colleges, compile tuition data and data on the cost of attendance in regards to the schools.
 - a. To compile tuition cost, use online resources such as Cappex to determine the tuition cost, using the in-state tuition price.
 - b. To compile the list of cost of attendance, use Cappex and add all costs that they list, including tuition, room and board, fees, and books and supplies.
3. Once all data on tuition and average cost has been collected, determine the county or county equivalent that each college is a part of. This can be most effectively done using an online map such as Google Earth.

4. Using the U.S. Census Bureau's data resources, collect data regarding average household income.
5. Organize all data into a spreadsheet.

DATA

Table 1.1 - Selected Community Colleges:

College Name	State	County Name
Aims Community College	Colorado	Weld
Allen Community College	Kansas	Allen
Cleveland Community College	North Carolina	Cleveland
Cochise College	Arizona	Cochise
Collin College	Texas	Collin
Davidson County Community College	North Carolina	Davidson
East Central Community College	Mississippi	Newton
Eastern Wyoming Community College	Wyoming	Goshen
Fort Peck Community College	Montana	Roosevelt
Georgia Northwestern Technical College	Georgia	Floyd
Germanna Community College	Virginia	Orange
Glendale Community College (California)	California	Los Angeles
Guttman Community College	New York	Manhattan
Hinds Community College	Mississippi	Hinds
Hudson County Community College	New Jersey	Hudson
Jamestown Community College	New York	Chautauqua
Jones County Community College	Mississippi	Jones
Laramie County Community College	Wyoming	Laramie
Nashua Community College	New Hampshire	Hillsborough
North Central Texas College	Texas	Cooke
Red Rocks Community College	Colorado	Jefferson
Robeson Community College	North Carolina	Robeson
Rock Valley Community College	Illinois	Winnebago
Rockingham Community College	North Carolina	Rockingham
San Antonio College	Texas	Bexar
Sullivan County Community College	New York	Sullivan
University of Arkansas Community College	Arkansas	Conway
Valencia College	Florida	Orange
Volunteer State Community College	Tennessee	Sumner
Washington County Community College	Maine	Washington

Note: There are multiple data points labelled as Orange County, but there are several different counties throughout the U.S. who go by that name.

Table 2.1 - Selected Public Schools:

College Name	State	County
Arizona State University	Arizona	Maricopa
Ball State University	Indiana	Delaware
Central Washington University	Washington	Kittitas
Christopher Newport University	Virginia	Newport *
Colorado Mesa University	Colorado	Mesa
Eastern Michigan University	Michigan	Washtenaw
Georgia Gwinnett University	Georgia	Gwinnett
Governors State University	Pennsylvania	Centre
Maine Maritime University	Maine	Hancock
Morgan State University	Maryland	Baltimore
Oakland University	Michigan	Oakland
Ohio University Zanesville	Ohio	Muskingum
Oklahoma Panhandle State University	Oklahoma	Texas
Queens College	New York	Queens
Rhode Island College	Rhode Island	Providence
Shawnee State University	Ohio	Scioto
Southeastern Oklahoma State University	Oklahoma	Bryan
Truman State University	Missouri	Adair
University of Maine at Augusta	Maine	Kennebec
University of Maryland, Baltimore	Maryland	Baltimore
University of North Carolina at Pembroke	North Carolina	Robeson
University of Nebraska - Lincoln	Nebraska	Lancaster
University of Pittsburgh at Greensburg	Pennsylvania	Westmoreland
University of Southern Indiana	Indiana	Vanderburgh
University of Wisconsin - Whitewater	Wisconsin	Walworth
Virginia Polytechnic Institute and State University	Virginia	Montgomery
West Liberty University	West Virginia	Ohio
Western Illinois University	Illinois	McDonough
Wichita State University	Kansas	Sedgwick
Wright State University	Ohio	Montgomery

*Note: Newport News is considered a sovereign city that is not a part of any county. Thus, the average income of the city was used in place of the average income of the county.

Table 1.2 - Community college tuition cost, total cost of attendance, and average county income:

County Name	Tuition Cost (\$)	Cost of Attendance (\$)	Avg. County Income (\$)
Weld County	2538	13213	56589
Allen County	1728	7154	49124
Cleveland County	3336	10886	53482
Cochise County	1752	7758	53482
Collin County	2040	3754	80504
Davidson County	1716	3466	55482
Newton County	1980	6940	49208
Goshen County	1896	10920	45287
Roosevelt County	1680	7975	36825
Floyd County	2040	3744	53482
Orange County	3675	5570	53482
Los Angeles County	1104	2885	59677
Manhattan County	4200	5790	66739
Hinds County	2160	7360	38021
Hudson County	6750	9453	53482
Chautauqua County	4220	15940	41975
Jones County	2490	7522	54512
Laramie County	1896	11376	53482
Hillsborough County	6720	8632	66777
Cooke County	1872	7250	53482
Jefferson County	2869	5024	69698
Robeson County	2288	4018	29594
Winnebago County	7650	9164	47864
Rockingham County	1716	3332	27696
Bexar County	5470	7496	50867
Sullivan County	4474	15476	61589
Conway County	1827	3412	25606
Orange County	1888	3644	47556
Sumner County	3336	4607	56193
Washington County	2640	9780	65272

Note: All values given in the table are based on dollar amounts consistent with inflation in 2015, and the average county income was a four year average from 2010-2014, converted into 2015 dollars in terms of inflation.

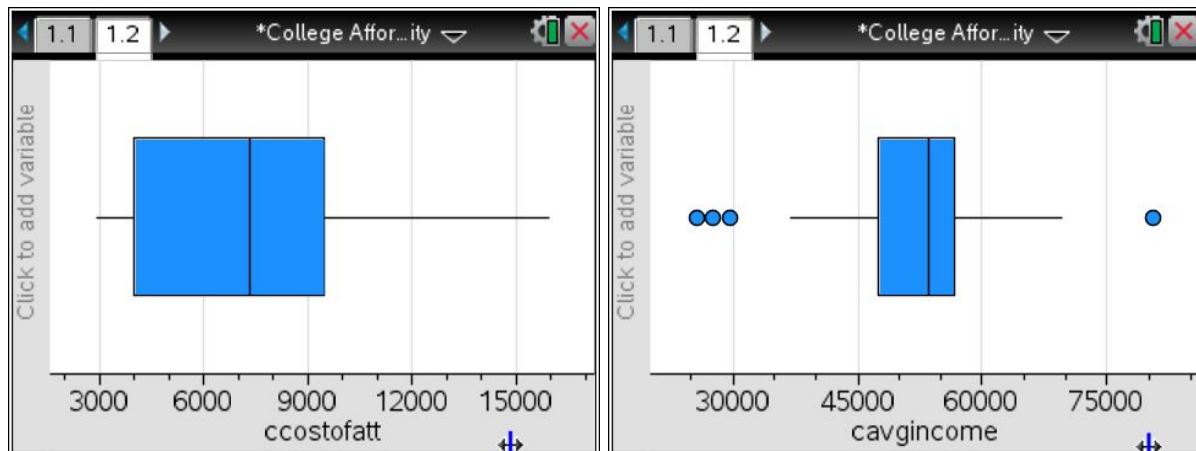
Table 2.2 - Tuition, Cost of Attendance, and Average County Income:

County Name	Tuition (\$)	Cost of Attendance (\$)	Avg. County Income (\$)
Maricopa	9343	20683	49158
Delaware	8498	19240	37339
Kittitas	7941	19773	45406
Newport	6520	22210	49184
Mesa	6008	16663	48610
Washtenaw	7989	18598	56126
Gwinnett	3462	17266	60329
Centre	9386	15300	71300
Hancock	9080	22498	48635
Baltimore	4816	18844	66940
Oakland	10613	20047	66436
Muskingum	4982	5884	40937
Texas	3645	12144	50172
Queens	6330	21882	55291
Providence	6530	18613	51077
Scioto	6085	17985	36945
Bryan	4682	12088	64651
Adair	7096	15768	32015
Kennebec	6510	8700	46559
Baltimore	7298	21984	66940
Robeson	3211	13385	29594
Lancaster	6480	18642	53105
Westmoreland	12208	23540	49734
Vanderburgh	6358	15518	32414
Walworth	6519	14078	52057
Montgomery	9617	20745	44810
Ohio	6226	16096	47454
McDonough	8406	22367	34786
Sedgwick	5622	13831	50326
Montgomery	8542	20510	43281

Note: Newport is not a county, but rather a sovereign state. Thus, for the purposes of this analysis, the average city income is recorded instead of the average county income.

DATA ANALYSIS AND GRAPHS

Graph 1.1 - Double boxplot of the total cost of attendance of community college and average county income:



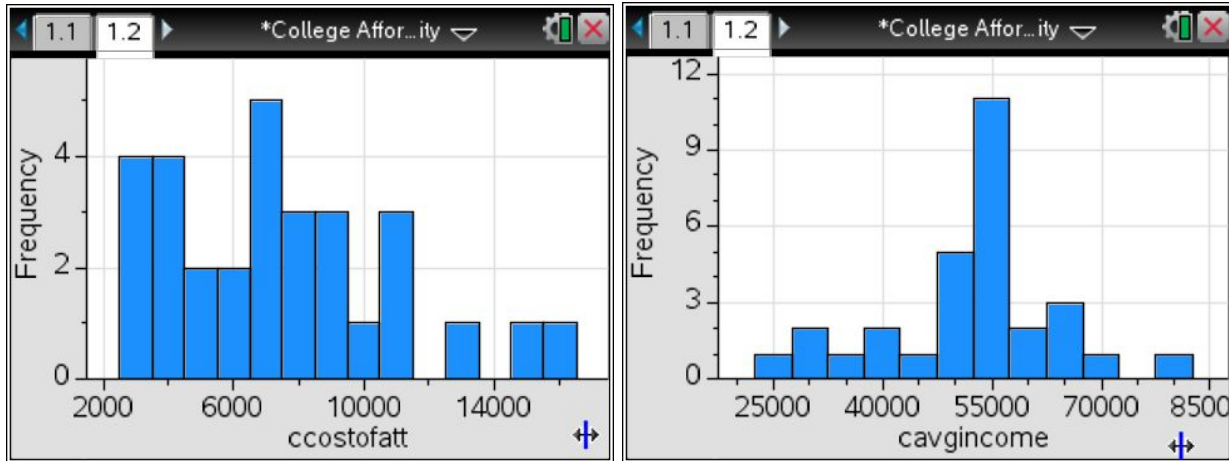
The boxplot of the data collected for the total cost of attendance of community college visually reflects how the data is skewed left, with no apparent outliers. The five-number summary for this data is:

\$2,885 \$4,018 \$7,305 \$9,453 \$15,940

For the average income of the thirty counties that were included in the study, the average appeared to be relatively symmetrical with exceptionally low incomes at \$25,606, \$27,696, \$29,594. There was also one exceptionally high income, which was \$80,504. The five-number summary for this data is

\$25,606 \$47,556 \$53,482 \$56,589 \$80,504

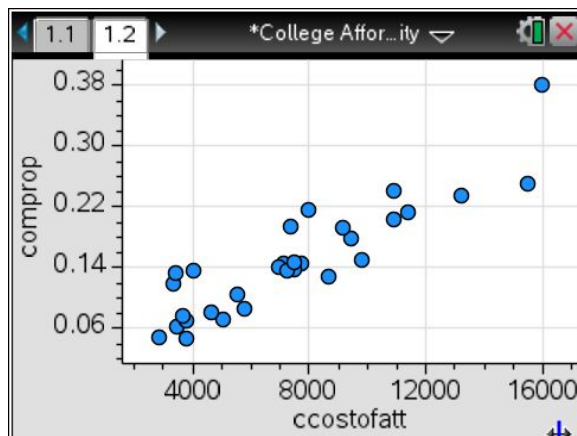
Graph 1.2 - Double histogram of cost of attendance vs. proportion of income spent on community college costs:



The distribution of costs of attendance for community colleges appears to be skewed left. There are notable gaps, where no data points were found, especially to the right of the mean. Moreover, there are notably high frequencies of costs of attendance that totalled \$3,000 and \$4,000. The mean of this data is \$7451,37, and the range is \$54,898.

In contrast, the graph of average county income appeared more symmetric, but still slightly skewed left. If the influential outlier of \$80,504 was removed, then the distribution would be even more skewed to the left. The mean of this data is \$51,901, and the range is \$54,898.

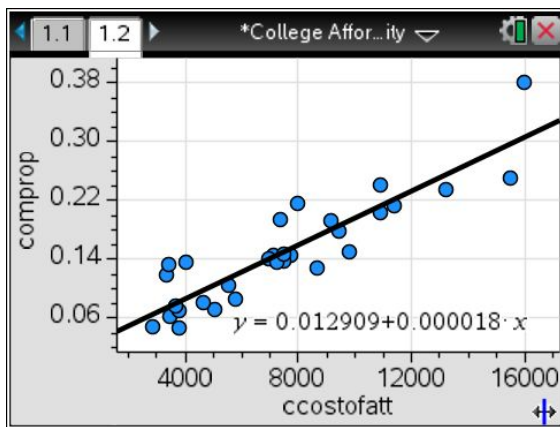
Graph 1.3 - Scatterplot of Cost of Attendance vs. proportion of income spent on community college costs:



This scatterplot shows a relatively strong positive correlation between the average cost of community college attendance, and the proportion of income that that cost consumes.

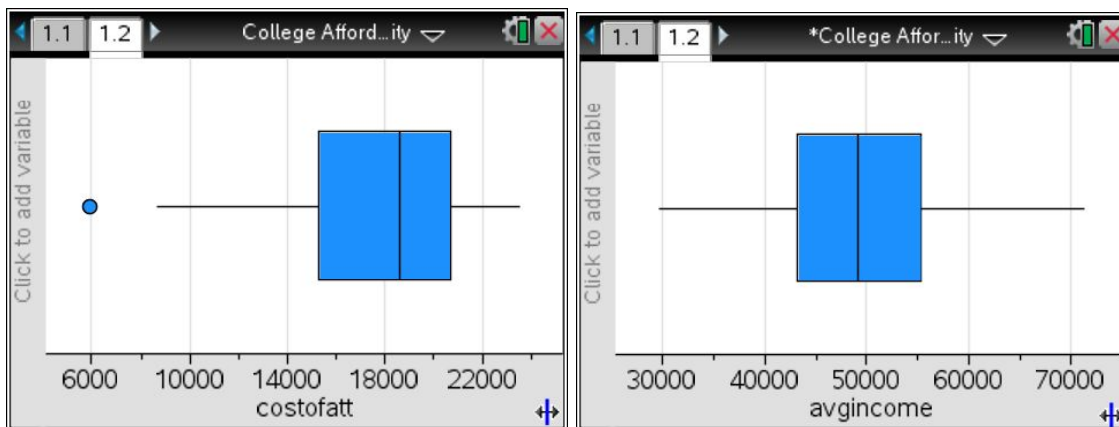
This trend is certainly logical, as higher costs naturally consume more income.

Graph 1.4 - Linearized graph of cost of attendance vs. proportion of income spent on community college costs:



The equation of this line is given by the function $y = 0.012909 + 0.000018(x)$, where y is the proportion of the household income consumed by college costs, and x is the cost of attendance. This correlation appears to be fairly strong.

Graph 2.1 - Double boxplot of the total cost of attendance of public college/university and average county income:



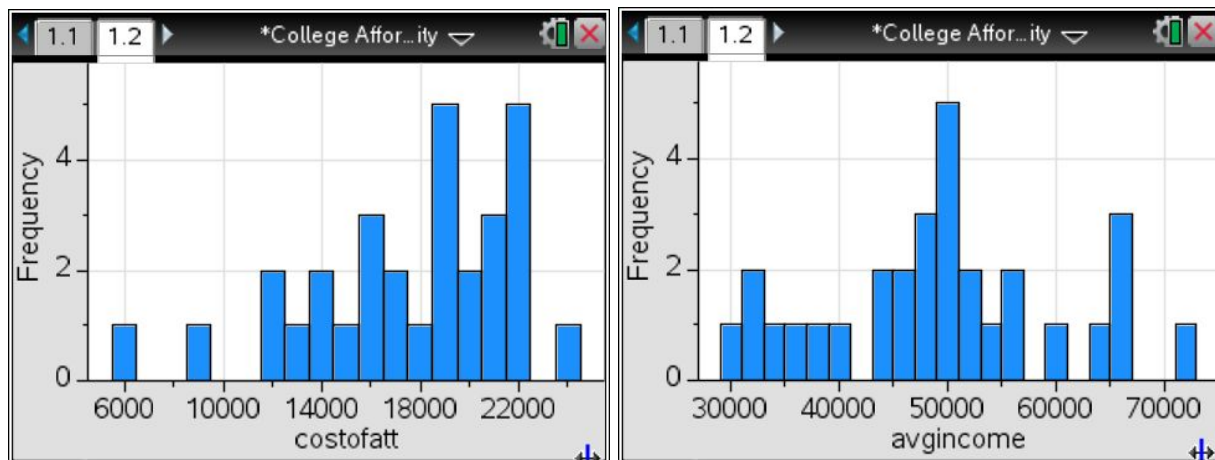
In regards to the average cost of attendance of public colleges/universities that grant four-year degrees, the data appears to be skewed to the left. There is one visible outlier at \$5,884. The five number summary for this data set is:

\$5,884 \$15,300 \$18,605 \$20,683 \$23,540

In contrast, the average income of the counties in which the colleges are in showed no apparent skew with no visible outliers. The five number summary for this data set is:

\$29,594 \$43,281 \$49,171 \$55,291 \$71,300

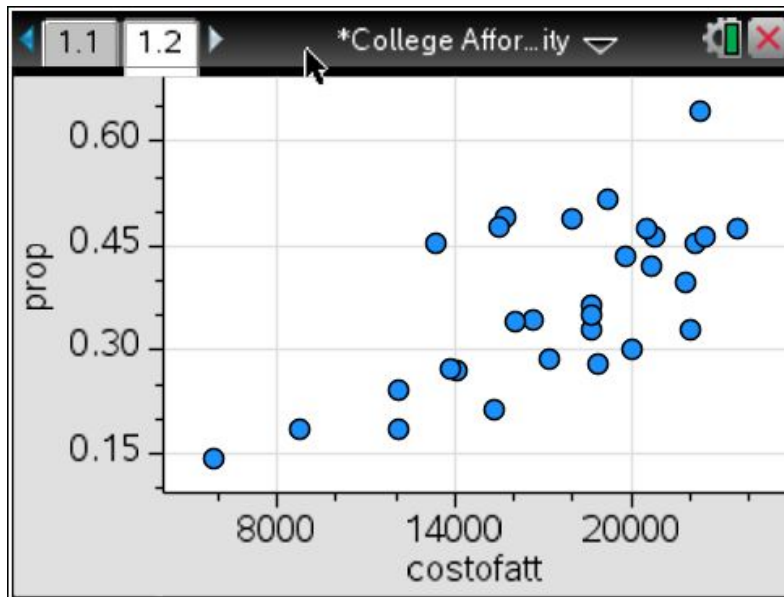
Graph 2.2 - Double histogram of cost of attendance vs. proportion of income spent on public college/university college costs:



In this histogram of the cost of attendance for public schools, the data set appears to be heavily skewed to the left. Moreover, the histogram appears to nearly be bimodal, with peaks both at \$19,000 and \$22,000.

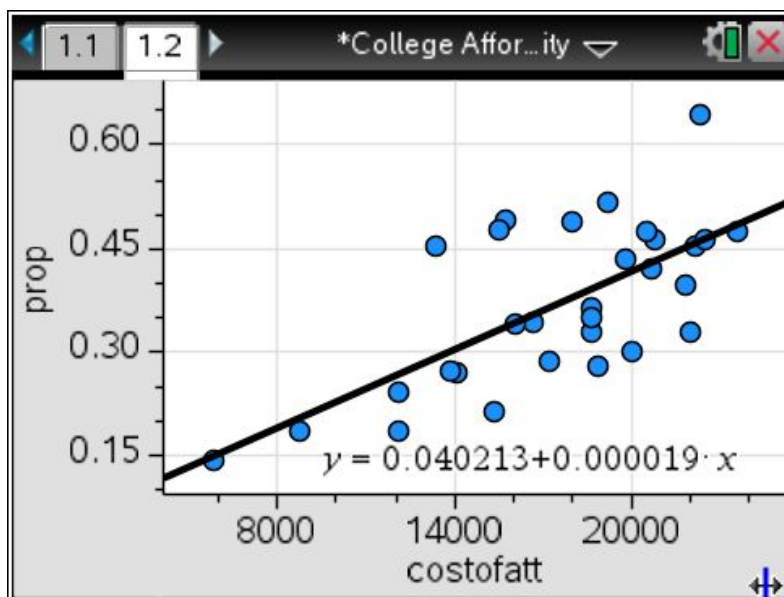
In regards to the histogram on the right, the distribution appears to be symmetrical. The data does not, however, appear to have a normal distribution.

Graph 2.3 - Scatterplot of Cost of Attendance vs. proportion of income spent on public college/university college costs.



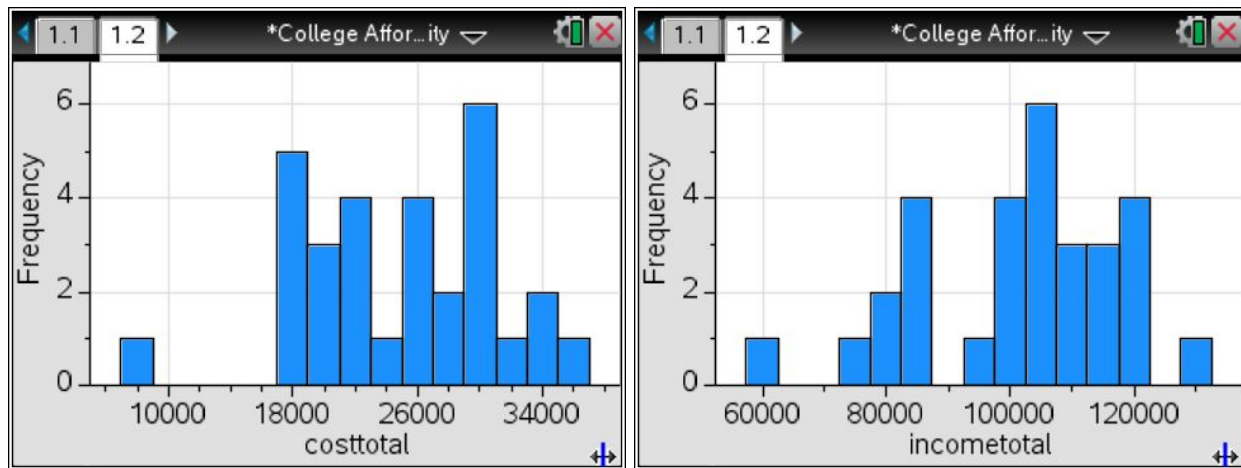
This scatterplot shows a fairly strong, positive linear correlation between the cost of attendance and the proportion of income spent on public college/university costs. Similarly to the graph regarding community colleges, this correlation is logical.

Graph 2.4 - Linearized graph of cost of attendance vs. proportion of income spent on public college/university college costs:



In regards to the linear relationship shown between the two variables, the equation of the least-squares regression line is represented by the function $y = 0.040213 + 0.000019(x)$, where y is the proportion of income spent on college, and x is the cost of attendance.

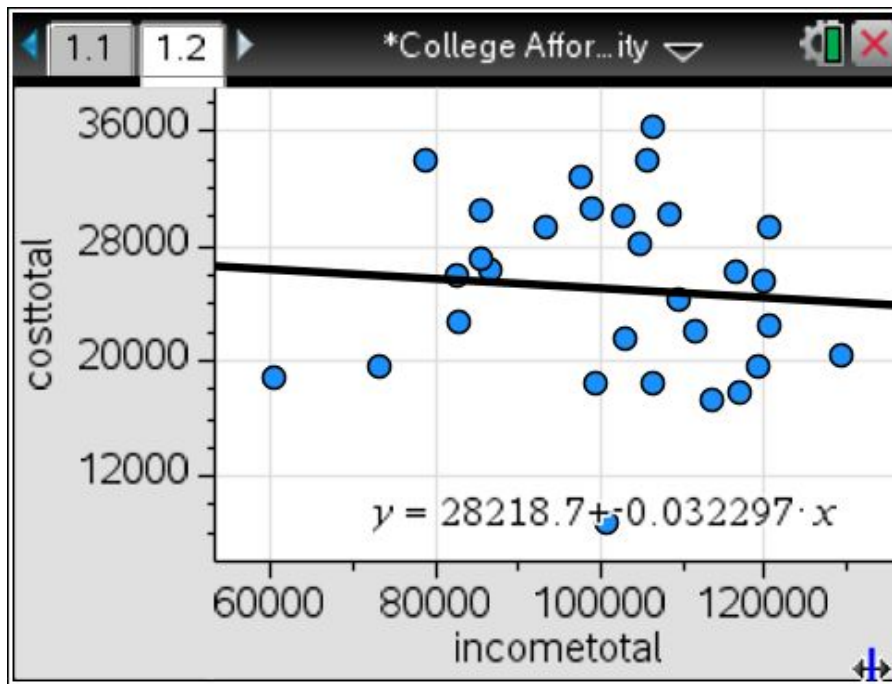
Graph 3.1 - Double histogram of all collected data on cost of attendance and proportion of income spent:



In the histogram presented on the left, the distribution of the total cost of attendance of the two types of colleges represented in this study is presented. This data does not appear to follow any sort of normal distribution.

The histogram on the right, which shows the distribution of the total average county income of the two types of schools collected in the study. This histogram appears to possibly follow a normal distribution, and certainly would be more normal if more data points were collected. It is important to note, however, that the outliers at \$60,000 prove to shift the distribution further away from linearity.

Graph 3.2 - Linearized graph of all collected data on cost of attendance vs. proportion of income spent:



Interestingly, when the two sets of average college costs and the two sets of average county income are combined, there does not appear to be any sort of correlation. The function that represents the least-squares regression

line of this data is $y = 28,218.70 - 0.032297(x)$, where y is the average total cost of college, and x is the average county income.

DATA INTERPRETATION

The graph of the least squares regression line of all collected data on cost of attendance compared to the proportion of income spent does not show any clear correlation between data points (Graph 3.1). The r-value, which reflects correlation is only 0.25. Thus, regardless of changes in income, the price that individuals are paying for college is the same, and this reflects a crucial paradox in the economics of college tuition. As with all other goods, the price of a specific good is the same regardless of the purchaser's income. Quite simply, the price of purchasing an item is not altered by the purchaser's income level or relative wealth. However, as the income level of the purchaser rises, more of the good is purchased. It is a simple notion, where individuals with more money are enabled to spend more of it. However, as seen with the graph of the scatter plot presented in Graph 3.1, this is not the case with college tuition. In contrast, the amount spent on college costs is the same regardless of income level. This phenomena goes against the normal laws of supply and demand and how they interact with purchaser income. While this in part can possibly be attributed to an increase in scholarships available to students of lower economic status, it also reflects how regardless of one's ability to pay, students are choosing to seek out higher levels of education. It is this notion that explains the incredible amounts of student loan debt that American students find themselves in.

Although the choice to go to college and to pay for college is ultimately a personal choice that possesses downsides (like student loan debt) that must be examined carefully, the proportion of income taken up by college expenses makes the option to go to college without loans increasingly impossible. In regards to the data collected on the proportion of income that is consumed by college tuition, the mean percent of the average household income spent on college

expenses is 25.3%, with a standard deviation of approximately 7.7%. In an effort to determine the population mean percentage of income that is spent on college costs, a confidence test was run on this data. Because the data was collected from a simple random sample, the data points are independent of each other, and the Central Limit Theorem states that the sample size was significantly large, this test is safe to use to estimate the population parameter. From this test, the population mean percentage of income spent on college costs is between 22.5% and 28.6% at the 95% confidence level. Thus, approximately a quarter of the average family's income is spent to send one of their family members to college, and if the family has multiple children, then massive amounts of the household income will be spent to send children to college, and stunted the economic growth of the family. While this number is certainly a cause for concern and thought, it also needs to be examined with certain caveats. While the sample was appropriately large according to the Central Limit Theorem, it is still a relatively small sample size when compared to the number of colleges in the United States. Moreover, this figure assumes that the student is not able to contribute to their education and did not receive scholarships. The average student's reality of paying for college is much more complex. Regardless, the sheer magnitude of the cost of college is astounding compared to the average household income of residents of the given county.

CONCLUSION

As America continues to become a nation of consumers, it must come to grapple with the reality of paying for said goods and services. While with most goods and services, one can simply choose not to purchase them, the reality of turning away a college education is a complicated decision with lifelong implications. Young Americans often feel trapped between needing a college education to succeed in the workforce and create income, but also going significantly in debt because of it. This complicated financial decision has massive amounts of implications for the individual, as it stifles their economic freedom and independence into adulthood. Thus, students turn increasingly to scholarships, grants, and other monetary sources to help offset the cost of college. However, these scholarship sources have increasingly become nearly impossibly competitive, making scholarship applications more like sweepstakes than a viable way of paying for school. Thus, American's hopes for new economic growth get stunted right out of the gates, and the debt they often have to go into to offset these costs has impacts on their financial decisions for the rest of their lives.

However, on a larger scale, this has implications for the health of the American economy. Because the age-distribution of America is so heavily skewed towards the elderly, the American economy relies on younger Americans in the workforce to support the elderly. However, with the introduction of crushing amounts of college debt into the mix, this balance is thrown off. Now, the average young American is less concerned with buying houses, cars, and building up their economy and more concerned with paying off the debt they have accumulated. Moreover, the fact that having a degree in America does not equate immediately to a job entails that the debt will likely sit and accumulate interest for years.

Thus the notion that over a quarter of a family's income may be chewed up to send one child to their local college is a fact that must be reckoned with as the country moves into the future. Regardless of the debate over whether or not college should be government-sponsored, the notion of saddling American families with the burden of paying for school while their students take out increasingly high levels of college debt is in serious need of reevaluation. At the very least, our students need to be prepared to effectively use their educational resources to mitigate the costs as much as possible. Because, quite simply, educating our country's future is crucial, but making them bleed dry with debt is counterproductive.

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